

LEARNING OBJECTIVES:

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| | 2.13.01 | Describe the general response and responsibilities of an RCT during any incident. |
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| | ☞ 2.13.02 | Identify any emergency equipment and facilities that are available, including the location and contents of emergency equipment kits. |
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| | ☞ 2.13.03 | Describe the RCT response to a Continuous Air Monitor (CAM) alarm. |
| | ☞ 2.13.04 | Describe the RCT response to a personnel contamination monitor alarm. |
| | ☞ 2.13.05 | Describe the RCT response to off scale or lost dosimetry. |
| | ☞ 2.13.06 | Describe the RCT response to rapidly increasing, unanticipated radiation levels or an area radiation monitor alarm. |
| | ☞ 2.13.07 | Describe the RCT response to a dry or liquid radioactive material spill. |
| | ☞ 2.13.08 | Describe the RCT response to a fire in a radiological area or involving radioactive materials. |
| | ☞ 2.13.09 | Describe the RCT response to other specific site incidents (as applicable). |
| | ☞ 2.13.10 | Describe the response levels associated with radiological emergencies. |
| | ☞ 2.13.11 | Describe site specific procedures for documenting radiological incidents. |
| | ☞ 2.13.12 | Identify the structure of the emergency response organization at your site. |
| | ☞ 2.13.13 | Identify the available offsite incident support groups and explain the assistance that each group can provide. |
| | ☞ 2.13.14 | Discuss radiological incidents at the plant or other plants, including cause, prevention, and recommended incident response. |

NOTE: This study guide should be developed using site specific information and regulatory documents. The following is a recommended format of material.

INTRODUCTION

Many people believe "it can't happen here" or "it won't happen to me" and do not take incident response planning seriously. But, incidents do occur, and experience has shown that the best response comes from workers who have prepared themselves with a plan for dealing with incidents. Each incident may be unique and no plan can be expected to give an exact solution to every problem, but a step-by-step approach for responding to a problem will help assure an appropriate response.

RADIOLOGICAL INCIDENTS

A radiological incident is an unplanned event involving radiation or radioactive materials. The response taken to an incident is usually governed by normal procedures.

Causes of radiological incidents could be one or more of several reasons:

- Ignorance
- Forgetfulness
- Oversight
- Unforeseen circumstances
- Communications failures
- Mechanical failures
- Human error
- Natural disasters

Having general guidance on response and a general plan of approach is good ALARA philosophy, because part of an appropriate response is the risk incurred by the responders and those involved as well as what is deemed to be an "acceptable" risk.

2.13.01 *Describe the general response and responsibilities of an RCT during any incident.*

GENERAL RESPONSE TO INCIDENTS

Although Health Physics personnel respond to an emergency using basic guidelines, an area or site may have specific procedures which have priority over these guidelines. Health Physics personnel must be familiar with the emergency procedures applicable to each site and the types of equipment to which they are assigned. The basic guidelines can then be used in conjunction with the specific procedures. Even with general or specific guidelines one's actions may change depending on the severity of an incident or whether one is a first responder, one of many responders, or a backup person.

The basic emergency response guidelines are:

- Define and assess the problem. The best contact is frequently the people at the scene. One should not over analyze the situation because time may be critical. Assess only what is needed for immediate action.
- Attempt to stop the cause of the emergency. No undue risks should be taken. One must always be aware that careless action may cause them to become part of the problem.
- Notify facility management and safety personnel. Minor incidents that can be handled by a single responding person may only require a telephone call when the opportunity presents itself. If more than one person is needed for an appropriate response, activation of a site emergency response network (such as dialing "911") is the manner in which notification should be given.
- Warn personnel in the area of the emergency. This keeps unnecessary personnel away from the event site, minimizing their exposure and risk.
- Isolate the area. Install barriers as quickly as possible to establish an exclusion area. The exclusion area may be very large initially. In determining the size of the exclusion area, consider the gamma dose rate, potential for criticality, possible spread of radioactive contamination or other hazardous material, weather conditions, non-radiological hazards, and security (site security may assist in establishing boundaries). Outside the exclusion area normal operations may

continue. Enlist whatever resources and personnel that are available to accomplish isolation and be prepared to help others in this endeavor even if there is no radiological risk.

- Minimize personnel exposure. No unnecessary exposure should be received. Plan supplementary operations as necessary to assure personnel exposure is minimized.
- Secure ventilation. Close entrances, windows, and the supply ventilation systems as necessary. Remember that most facilities are designed for proper ventilation and frequently one merely has to ensure that the design condition are being met such as closing doors, windows, and other openings that should not be open. One should only alter designed ventilation if it is obvious that ventilation and improper air flow patterns are contributing to the incident and impeding bringing it under control. Even with the conclusion to change ventilation, one should consult with facility management to determine the impact of changing ventilation on other activities that may be affected.
- Perform surveys. Health Physics personnel are trained to perform emergency surveys. The types of surveys will vary with the nature of the emergency. Good quality surveys take time. Do not short cut or speed up surveys unless a real need such as a medical need exists.
- Initiate the recovery. This includes clean-up operations, decontamination and moving the exclusion area barricade inward.

The RCT is the Health Physics person on site that has the experience, instruments, and the responsibility for radiation safety and other personnel will seek them out for answers. Be prepared to respond with answers, directives, and/or suggestions. Don't assume others will automatically know what to do. Debriefings for lessons learned typically obtain good information from the initial responders to incidents.

2.13.02 *Identify any emergency equipment and facilities that are available, including the location and contents of emergency equipment kits.*

FACILITIES AND EQUIPMENT

(Insert site specific information here.)

RCT's should always know the resources and equipment available to them in the area where they are working. These resources include the physical location, people, equipment, and communications.

2.13.03 *Describe the RCT response to a Continuous Air Monitor (CAM) alarm.*

RESPONSE TO A CONTINUOUS AIR MONITOR (CAM) ALARM

(Insert site specific information here.)

Continuous Air Monitors (CAM's) can be used for many reasons. As a result, they may have different alarm setpoints depending on the expected isotopes to be seen and the type of work being performed in the area.

When a CAM alarms, personnel will evacuate the area. RCT's should report to the area and survey all affected personnel. Personnel should be interviewed to determine the cause of the alarm.

Re-entry into an area that has been evacuated because of a CAM alarm should be considered an emergency response and should only be undertaken with proper protective clothing and respiratory protection.

2.13.04 *Describe the RCT response to a personnel contamination monitor alarm.***RESPONSE TO PERSONNEL CONTAMINATION MONITOR ALARM**

(Insert site specific information here.)

- The RCT shall notify Health Physics Supervision of all contaminated or potentially contaminated individuals and report to the scene. The RCT should bring portable instrumentation for direct alpha and beta-gamma surveys as well as media for collecting smears if necessary.
- The affected worker should remain in the area.
- The RCT should perform whole body surveys (frisk) for both alpha and beta-gamma in addition to the specific area of the individual that caused the alarm. The RCT must take care not to contaminate either himself or the instruments.
- Always suspect an uptake if contamination is verified and survey for facial contamination taking nasal smears or nose blows as appropriate. If positive, contact Health Physics Supervision and/or Medical before releasing personnel.
- The RCT should take actions to minimize cross-contamination, such as putting a glove on a contaminated hand especially when moving or transporting personnel.
- Document all surveys, using the appropriate forms, and estimate skin dose. Do not unduly delay any decontamination efforts in order to document contamination because dose is being incurred as long as the skin remains contaminated. Perform a good survey as rapidly as possible and then decontaminate.
- Gather information from the individual that would be useful in follow-up surveys of the work area and the path from that area to the contamination monitor. These areas should be surveyed and/or smeared as appropriate.
- Typical follow-up actions would be removal of contaminated clothing and/or decontamination of minor skin contamination. For minor skin contamination, decontaminate using a mild non-abrasive soap and tepid water or use decon towelettes. Continue decontamination attempts as long as there is a significant reduction in activity. Be careful not to irritate the skin.

- Part of any response should also be the verification that the contamination monitor is working properly. False alarms are not only caused by equipment failure but also by non-work related situations such as environmental radon resulting from local conditions. The equipment should not be returned to service until it is determined it is working properly. Do not change the alarms or alarm setpoints. If the alarm cannot be silenced through the normal procedure, take the equipment out of service.

2.13.05 *Describe the RCT response to off scale or lost dosimetry.*

RESPONSE TO OFF-SCALE OR LOST DOSIMETRY

(Insert site specific information here.)

- Off-scale self reading personal dosimeter
 1. Assure that the worker is placed in as safe an area as possible (low dose area) and that the work has been left in a safe condition where possible.
 2. Alert others working in the area.
 3. Evaluate the situation. All dose indicated by the dosimeter is assumed to have been received by the individual until it can be clearly demonstrated otherwise.
 4. Gather data for dose estimate if necessary. Practice ALARA by using remote or extendable instruments to measure high level radiation fields. For High exposures, the official permanent dosimetry (TLD or film badge) may have to be retrieved for processing.
- For lost dosimetry, typical actions include:
 1. Individual(s) must leave the area if dosimetry is required.
 2. Contact RC supervision for reissue of dosimetry.

2.13.06 *Describe the RCT response to rapidly increasing, unanticipated radiation levels or an area radiation monitor alarm.*

**RESPONSE TO RAPIDLY INCREASING, UNANTICIPATED RADIATION LEVELS
OR AN AREA RADIATION MONITOR ALARM**

(Insert site specific information here.)

- Typical actions include:
 1. Evacuate personnel as quickly as possible to a safe area (low dose area).
 2. Verify low dose area radiation levels are acceptable.
 3. Evaluate the situation. The best contact is people at the scene.
 4. Notify facility management and safety. Whether or not to activate a site emergency response program (such as dialing 911) is determined by the nature of the incident. Activation usually automatically fulfills this requirement.
 5. Re-occupy area only when radiation levels return to normal background.
 6. Document all surveys using appropriate forms.

2.13.07 Describe the RCT response to a dry or liquid radioactive material spill.**RESPONSE TO DRY OR LIQUID RADIOACTIVE SPILL**

(Insert site specific information here.)

- **STOP** the spill. Take appropriate precautions that are dependent on the situation. All spills are different. Correct the situation immediately if possible without taking undue risks.
- **WARN** other personnel. Let people around know what is going on. If the situation warrants, evacuate the area. Notify your supervisor, facility management, and emergency response network if appropriate. As before, whether or not to activate a site emergency response program (such as dialing 911) is determined by the nature of the incident. Activation usually automatically fulfills this requirement. When a situation is confusing, not fully understood, or may not be controllable; over reacting is better than under reacting.
- **ISOLATE** the area. Establish boundaries around the spill area for exposure and contamination control.
- **MINIMIZE** exposure to yourself as well as others. Practice ALARA principles and use all protective gear available.
- **SECURE** ventilation by controlling HVAC (heating, ventilation, air conditioning). Unless one is certain that ventilation is contributing to the incident, this may involve no more than just ensuring that conditions are correct for normal designed ventilation.
- **FOLLOW THROUGH** as necessary by starting and collecting air samples as may be indicated, surveying for contamination, and decontaminating. The cleanup of major spills may very likely involve many people and require Radiation Work Permits and ALARA reviews of activities. Do not try to clean up a major spill by yourself, just keep it contained and isolated until the entire clean up operation is formulated. Complete all documentation of surveys and logs.

2.13.08 *Describe the RCT response to a fire in a radiological area or involving radioactive materials.*

RESPONSE TO A FIRE IN A RADIOLOGICAL AREA OR INVOLVING RADIOACTIVE MATERIALS

(Insert site specific information here.)

Typically Health Physics will supply support to the Fire Department and will be represented at the Command Post.

2.13.09 *Describe the RCT response to other specific site incidents (as applicable).*

RESPONSE TO OTHER FACILITY SPECIFIC INCIDENTS

(Insert site specific information here.)

2.13.10 *Describe the response levels associated with radiological emergencies.*

EMERGENCY RESPONSE LEVELS

(Insert site specific information here.)

General Emergency

A response level that represents an event in progress or having occurred and that involves actual or imminent substantial reduction of facility safety systems, in which offsite releases of radioactive or other hazardous substances are occurring or are expected to occur which exceed protective guidelines.

Site Emergency

An emergency response level which represents an event in progress or having occurred that involves actual or likely major failures of facility functions that are needed for the protection of onsite personnel, the public health and safety, and the environment. Releases offsite of radioactive or other hazardous substances not exceeding protective guidelines are occurring or are likely to occur.

Alert

An emergency level that represents an event in progress or having occurred which involves an actual or potential substantial reduction of the level of safety or the facility. Limited offsite releases of radioactive or other hazardous substances may occur but are not expected to produce negative offsite impacts.

Unusual Event

An emergency response level which represents an event in progress or having occurred that normally would not constitute an emergency but which indicated an potential reduction of safety of a facility and in which no potential exists for significant offsite release of radioactive or other hazardous substances. Activation of offsite response organizations is not expected.

2.13.11 Describe site specific procedures for documenting radiological incidents.

DOCUMENTATION OF RADIOLOGICAL INCIDENTS AND EVENT CATEGORIZATIONS

(Insert site specific information here.)

2.13.12 *Identify the structure of the emergency response organization at your site.*

EMERGENCY RESPONSE ORGANIZATION

(Insert site specific information here.)

2.13.13 *Identify the available offsite incident support groups and explain the assistance that each group can provide.*

OFFSITE SUPPORT GROUPS

(Insert site specific information here.)

2.13.14 *Discuss radiological incidents at the plant or other plants, including cause, prevention, and recommended incident response.*

SITE SPECIFIC LESSONS LEARNED

(Insert site specific information here.)

REFERENCES

(Insert site specific references here.)